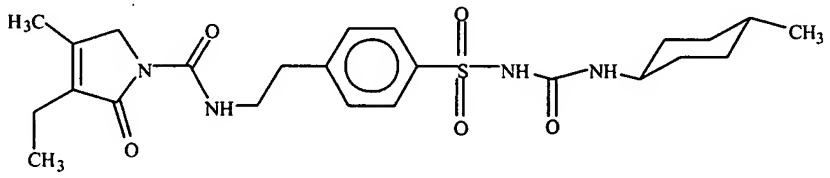
We claim

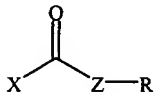
1) A process for the preparation of *trans*-3-Ethyl-2,5-dihydro-4-methyl-N-[2-[4-[[[[(4-methylcyclohexyl)amino]carbonyl]amino]sulfonyl]phenyl]ethyl]- 2-oxo-1*H*-pyrrole-1-carboxamide, a compound of the formula 1,



Formula 1

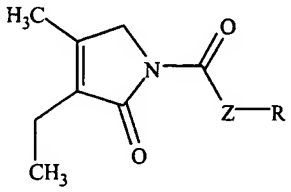
comprising,

a) reacting 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2,



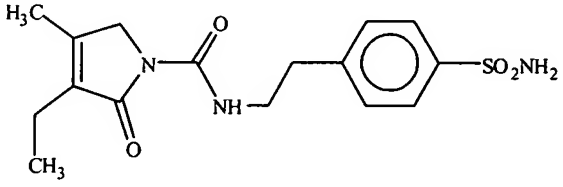
Formula 2

to obtain a compound of formula 3,



Formula 3

b) reacting a compound of formula 3 with 4-(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4,



Formula 4

c) and further reacting the compound of formula 4 with *trans*-4-methylcyclohexyl isocyanate to obtain the compound of formula 1,

wherein,

X is halogen, nitroaryl or haloaryl,

Z is O, S or NY, wherein Y is C_1-C_5-alkyl, C_1-C_5-haloalkyl, aryl or aralkyl, and

R is aryl or heteroaryl, where aryl or hetroaryl radical is unsubstituted or substituted by one or more radicals from the group consisting of nitro, halogen, cyano, azido, haloalkyl, CO-R^1, SR^2, SO-R^3 and SO_2-R^4,

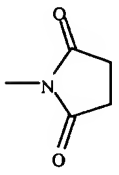
R^1 is H, C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-alkoxy or C_2-C_5-alkenoxy,

R^2 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl,

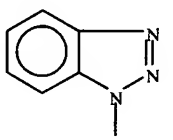
R^3 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl,

R^4 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl, or

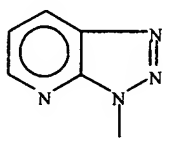
the moiety represented below by P, Q, S or T.



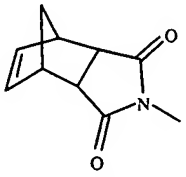
(P)



(Q)

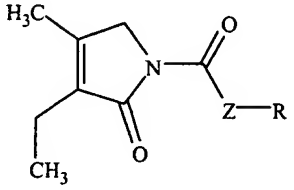


(S)



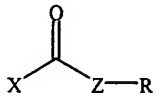
(T)

2) A process for the preparation of a compound of formula 3,



Formula 3

comprising reacting 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2,



Formula 2

wherein,

X is halogen, nitroaryl or haloaryl,

Z is O, S or NY, wherein Y is C_1-C_5-alkyl, C_1-C_5-haloalkyl, aryl or aralkyl, and

R is aryl or heteroaryl, where aryl or hetroaryl radical is unsubstituted or substituted by one or more radicals from the group consisting of nitro, halogen, cyano, azido, haloalkyl, CO-R^1, SR^2, SO-R^3 and SO_2-R^4,

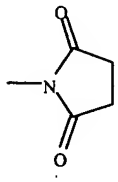
R^1 is H, C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-alkoxy or C_2-C_5-alkenoxy,

R^2 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl,

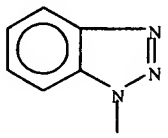
R^3 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl,

R^4 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl, or

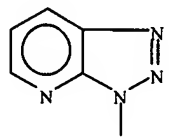
the moiety represented below by P, Q, S or T.



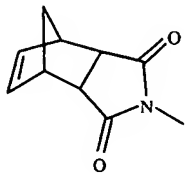
(P)



(Q)

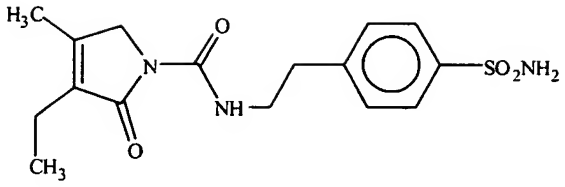


(S)



(T)

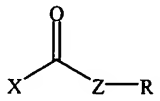
3) A process for the preparation of a compound of formula 4,



Formula 4

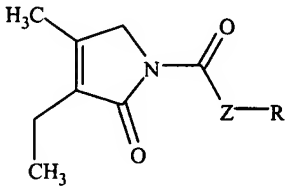
comprising,

a) reacting 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2,



Formula 2

to obtain a compound of formula 3,



Formula 3

b) reacting a compound of formula 3 with 4-(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4,

wherein,

X is halogen, nitroaryl or haloaryl,

Z is O, S or NY, wherein Y is C_1-C_5-alkyl, C_1-C_5-haloalkyl, aryl or aralkyl and

R is aryl or heteroaryl, where aryl or hetroaryl radical is unsubstituted or substituted by one or more radicals from the group consisting of nitro, halogen, cyano, azido, haloalkyl, CO-R^1, SR^2, SO-R^3 and SO_2-R^4,

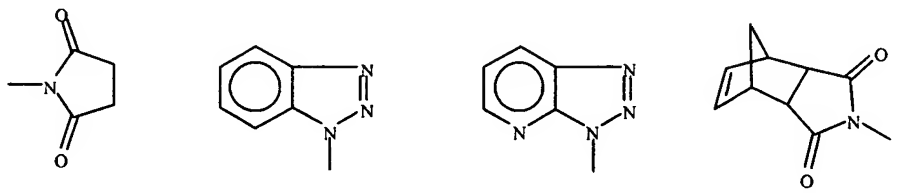
R^1 is H, C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-alkoxy or C_2-C_5-alkenoxy,

R^2 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl,

R^3 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl,

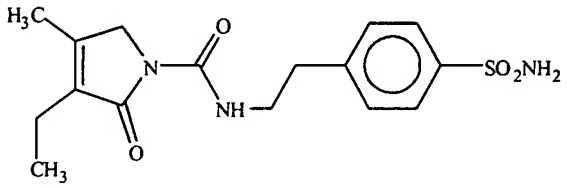
R^4 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl, or

the moiety represented below by P, Q, S or T.



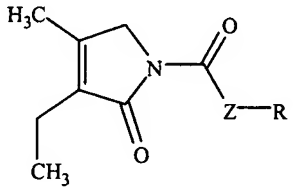
(P) (Q) (S) (T)

4) A process for the preparation of a compound of formula 4,



Formula 4

comprising reacting a compound of formula 3



Formula 3

with 4-(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4,

wherein,

Z is O, S or NY, wherein Y is C_1-C_5-alkyl, C_1-C_5-haloalkyl, aryl or aralkyl and

R is aryl or heteroaryl, where aryl or hetroaryl radical is unsubstituted or substituted by one or more radicals from the group consisting of nitro, halogen, cyano, azido, haloalkyl, CO-R^1, SR^2, SO-R^3 and SO_2-R^4,

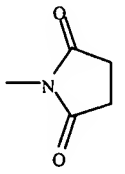
R^1 is H, C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-alkoxy or C_2-C_5-alkenoxy,

R^2 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl,

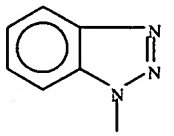
R^3 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl,

R^4 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl, or

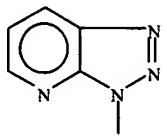
the moiety represented below by P, Q, S or T.



(P)



(Q)



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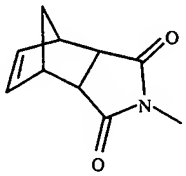
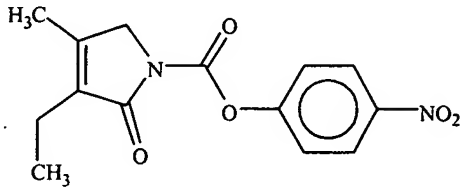


(T)

5) The process as claimed in claim 4 wherein the compound of formula 4 is further reacted with *trans*-4-methylcyclohexyl isocyanate to obtain the compound of formula 1.

6) The process as claimed in claim 1, 2 or 3 wherein the reaction of 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2, is carried out in presence of an organic base.

7) The process as claimed in claim 1, 2 or 3 wherein 3-Ethyl-4-methyl-3-pyrrolidin-2-one is reacted with the compound of formula 2, wherein Z is O and R is 4-nitrophenyl,



Formula 3a

to obtain a compound of formula 3a.

8) The process as claimed in claim 1 comprising,

a) reacting 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2, wherein Z is O and R is 4-nitrophenyl, to obtain a compound of formula 3a,

b) reacting the compound of formula 3a with 4-(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4,

c) and further reacting the compound of formula 4 with *trans*-4-methylcyclohexyl isocyanate to obtain the compound of formula 1.

9) The process as claimed in claim 3 comprising,

a) reacting 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2, wherein Z is O and R is 4-nitrophenyl, to obtain a compound of formula 3a,

b) reacting the compound of formula 3a with 4-(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4.

10) The process as claimed in claim 4 comprising reacting a compound of formula 3, wherein Z is O and R is 4-nitrophenyl with 4-(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4.

11) The process as claimed in claim 5, wherein the compound of formula 4 is prepared by a process comprising reacting a compound of formula 3, wherein Z is O and R is 4-nitrophenyl, with 4-(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4.

12) The process as claimed in claim 1, 2 or 3 wherein the reaction of 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2, is carried out in presence of an organic base selected from the group consisting of 4-dimethylaminopyridine; 4-pyrrolidinopyridine; diisopropylethylamine, tetramethylguanidine; 1,8-diazabicyclo[5.4.0]undec-7-ene; 1,5-diazabicyclo [4.3.0] non-5-ene; 2,6-lutidine and picolines.

13) The process as claimed in claim 1, 2 or 3 wherein the reaction of 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2 is carried out in presence of an acid scavenger compound.

14) The process as claimed in claim 1, 2 or 3 wherein the reaction of 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2 is carried out in presence of an acid scavenger compound selected from the group consisting of trialkylamines, pyridine, sodium carbonate and potassium carbonate.

15) The process as claimed in claim 1, 2 or 3 wherein the reaction of 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2 is carried out in presence of an acid scavenger compound characterised in that the acid scavenger compound is triethylamine.

16) The process as claimed in claim 1, 2 or 3 wherein the reaction of 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2 is carried out in presence of an organic base and an acid scavenger compound, characterised in that the organic base is 4-dimethylaminopyridine and the acid scavenger compound is triethylamine.

17) The process as claimed in claim 1, 2 or 3 wherein the reaction of 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2 is carried out in presence of a solvent selected from the group consisting of aliphatic or aromatic hydrocarbons, ethers, nitriles and amides.

18) The process as claimed in claim 1, 2 or 3 wherein the reaction of 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2 is carried out in a chlorinated hydrocarbon solvent.

19) The process as claimed in claim 1, 2 or 3 wherein the reaction of 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2 is carried out in dichloromethane.

20) The process as claimed in claim 1, 2 or 3 wherein the reaction of 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2 is carried out at a temperature between the range of about 0°C to about 35°C for about 8 to about 15 hours.

21) The process as claimed in claim 1, 3 or 4 wherein the reaction of a compound of formula 3 with 4-(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4, is carried out in the presence of a solvent selected from the group consisting of aliphatic or aromatic hydrocarbons, ketones, nitriles and amides.

22) The process as claimed in claim 10 wherein the reaction is carried out in acetone.

23) The process as claimed in claim 1, 3 or 4 wherein the reaction of a compound of formula 3 with 4-(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4, is carried out at a temperature between the range of about 35°C to about 80°C for about 0.5 to about 20 hours.

24) The process as claimed in claim 2, comprising reacting 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2, wherein X is Cl, Z is O and R is 4-nitrophenyl, to obtain 3-Ethyl-4-methyl-2,5-dihydro-N-(4-nitrophenyloxy carbonyl)-pyrrole-2- one, a compound of formula 3a, having purity of greater than 99%.

25) The process as claimed in claim 24, wherein the compound of formula 3a is further reacted with 4(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4 having purity of greater than 99%.

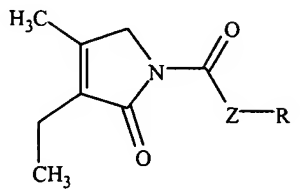
26) The process as claimed in claim 1 comprising,

a) reacting 3-Ethyl-4-methyl-3-pyrrolidin-2-one with a compound of formula 2, wherein X is Cl, Z is O and R is 4-nitrophenyl, to obtain a compound of formula 3a,

b) reacting the compound of formula 3a with 4-(2-Aminoethyl)benzene sulfonamide to obtain 4-[2-(3-Ethyl-4-methyl-2-carbonyl pyrrolidine amido)ethyl]benzene sulfonamide, a compound of formula 4,

c) and further reacting the compound of formula 4 with *trans*-4-methylcyclohexyl isocyanate to obtain the compound of formula 1 having purity of greater than 99%.

27) The intermediate compound of formula 3,



Formula 3

wherein,

Z is O, S or NY, wherein Y is C_1-C_5-alkyl, C_1-C_5-haloalkyl, aryl or aralkyl, and

R is aryl or heteroaryl, where aryl or hetroaryl radical is unsubstituted or substituted by one or more radicals from the group consisting of nitro, halogen, cyano, azido, haloalkyl, CO-R^1, SR^2, SO-R^3 and SO_2-R^4,

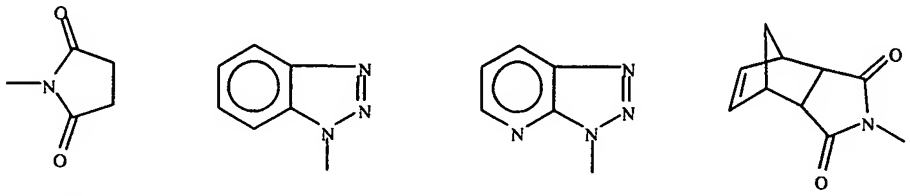
R^1 is H, C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-alkoxy or C_2-C_5-alkenoxy,

R^2 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl,

R^3 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl,

R^4 is C_1-C_5-alkyl, C_2-C_5-alkenyl, C_2-C_5-alkynyl, C_1-C_5-haloalkyl or C_2-C_5-haloalkenyl, or

the moiety represented below by P, Q, S or T.

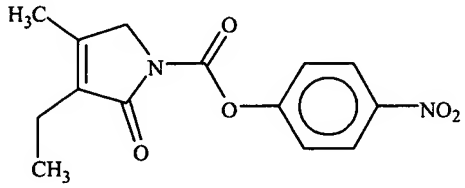


(P) (Q) (S) (T)

28) The intermediate compound of formula 3, as claimed in claim 27 wherein Z is O and R is aryl or the moiety represented by (P), (Q), (S) or (T), characterised in that aryl is phenyl substituted with one or more radicals selected from nitro, halo, cyano, 4-trifluoroalkyl, 2,4-bis(trifluoroalkyl) or 2,6-bis(trifluoroalkyl).

29) The intermediate compound of formula 3, as claimed in claim 27, wherein Z is O and R is selected from phenyl substituted with 4-nitro, 2,4-dinitro, 2,6-dinitro, 4-halo, 2,4-dihalo, 2,6-dihalo, 4-trifluromethyl, 2,4-bis(trifluoromethyl) or 2,6-bis(trifluoromethyl).

30) The intermediate compound of formula 3a.



Formula 3a

31) The intermediate compound of formula 3, as claimed in claim 27, wherein Z is O and R is represented by the moiety (P), (Q), (S) or (T).